

## ***Increasing lifetime performance starts with good calf management.***

**International Dairy Topics, Vol 16, No 5, pp 15-17**

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Raising healthy heifers is a key component to achieve future high productivity and to increase the lifetime performance of the dairy's cows. Many dairy farmers need to allocate more of their resources to calf and heifer management, and it is important to show that this investment is worthwhile and cost-effective.

Good nutrition and management routines will prevent most heifer diseases as well as ensure optimal growth. For optimal future productivity, the absence of apparent disease is not sufficient. Heifer nutrition should meet the growing animal's nutritional needs as well as support the transformation of the pre-ruminant calf into a ruminating high producing dairy cow with a good udder development. Stress in heifers due to parturition, nutrition, dietary changes, transport, farm location changes, surgical interventions, social group systems, overcrowding and other environmental conditions are all risks for disease.<sup>1</sup> A good immunity is necessary to maintain health in our current dairy production systems where numerous and diverse pathogens are continually challenging the health, welfare and productivity of our animals.

### **Dam health and calving management**

A strong calf is created in a healthy and strong cow and colostrum quality and quantity is influenced by the dam's pre-calving nutrition and micro-nutrition.<sup>2</sup> Deficiencies of micro-nutrients (iodine, selenium, copper and zinc) have been associated with high stillbirth rates.<sup>3</sup> For example, organic selenium supplementation to dry cows provides increased selenium concentration in colostrum and milk compared to inorganic selenium and this has been shown to improve calf health and weight gain.<sup>4</sup> Mannan-oligosaccharide supplementation of the dam has also been shown to improve the colostrum antibody levels to rotavirus following vaccination.<sup>5</sup> Alltech's Mineral Management and Gut Health Programme can assist the farmer in providing the best possible conditions for the dry cows that will not only benefit the calf, but also the coming lactation.

Perinatal mortality in cows and heifers varies between 2 and 20% across dairy industries internationally with the majority of countries between 5 and 8%.<sup>1;3</sup> Most calves that die in the perinatal period were alive at the start of calving and assisting many times does more harm than good. It is essential that a calf is born in a clean and comfortable area. It is best for the calf to land on deep clean straw, and not on concrete, manure or slatted floors. During the winter, the temperature challenges for a newborn calf can involve a temperature drop of 50°C compared to the womb. The newborn calf needs to be dried off as quickly as possible after birth and placed in a draft free environment. The temperature challenges can be reduced by providing an infrared lamp, an insulated calf pen and a jacket.

### **Colostrum is critical for a healthy strong calf**

Colostrum is the first source of liquid, energy, nutrients, vitamins, antibodies (immunoglobulins) and various bioactive substances that the calf will ingest.<sup>6</sup> The colostrum immunoglobulins protect the calf against pathogens and disease during the time that the young ruminants own immune system is evolving. During the first 24 hours of life, the calf

gut has the ability of taking up immunoglobulins into the blood, instead of digesting them (passive transfer of immunity), but for every hour that passes since birth, the transfer of these immunoglobulins into the blood decreases. In general, if a dairy farm has continuous problems with high mortality, the most frequent cause is that there is failure in the timely (within a few hours of birth) administration of sufficient quantities (10% of calf body weight) good quality hygienic colostrum (>50 g/L of IgG and total bacterial plate count <100,000 cfu/mL). A refractometer or a colostrometer to evaluate immunoglobulin content of the colostrum is essential, since colostrum quality in dairy cows has large variations.<sup>7</sup> A good way to ensure good passive transfer of immunity is to bottle and/or oesophageal tube feed the colostrum directly after birth. A second feeding of colostrum within 6-10 hours is strongly recommended prior to gradual transitioning over to milk or milk replacer. Checking the immunoglobulin concentration in the blood of the calves 2-5 days after birth is a good way to monitor farm practices by either measuring serum total proteins (> 5,5 gr/L) or serum Immunoglobulin G levels (preferably > 1600 mg/dL).

A study evaluated the effects of feeding two compared to four liters of colostrum immediately after birth on growth and lactational performance as growing heifers and lactating cows.<sup>8</sup> Veterinary costs were 60% lower and average daily gain from birth to conception was 200 grams higher for heifers fed 4 L of colostrum compared to those fed 2 L. In the first two lactations the heifers that had been 4L produced 550 kg more milk and had 16% decreased early culling rate. Another study indicated that for each milligram IgG /mL of blood at 24 h of age, first lactation milk yield increased by 8,5 kg.<sup>9</sup> Therefore, high priority needs to be on this colostrum feed, since there is only one time for the heifer to get it right.

### **Pre-weaning feeding impacts future productivity**

The pre-weaned calf nutrition is very important to provide the calf with energy and nutrients to maintain basic body functions, grow and develop the immune system. Numerous studies have evaluated the impact of pre-weaning growth and feeding systems on future milk production. There is a meta-analysis of these studies indicating that for every 100 gr/day of increased growth, the heifer will produce 155 kg more milk in the first lactation.<sup>10</sup> A rule of thumb is that a heifer should double her birth weight by the time of weaning. Many dairy calves are not fed sufficient quantities milk or milk replacer during the preweaning period, especially during the first few weeks of life when grain intake is limited. The underfed calf is not able to compensate for lack of energy and nutrients from the milk feed by increasing grain intake and calves that are not feeling well usually decrease grain intake prior to decreasing milk intake. Therefore it is absolutely essential to assure that the milk feed provides sufficient energy for maintenance, growth and to support the immune functions.

Many dairy producers and clinical studies have shown that feeding milk or pasteurized waste milk (milk withheld from human consumption) may provide better growth and health. This is most likely attributed to the higher fat and protein content of cow's milk compared to milk replacer. The challenge is to set up hygienic milk handling and pasteurization routines for feeding calves cow's milk. Therefore, milk replacers are for many farmers easier to handle and feed. It is important to choose a high quality milk replacer where the protein source is milk proteins and the fat level is high enough to provide sufficient energy for the calf to grow. Whether using milk or milk replacer it is of value to check the dry matter concentration fed, and to carefully calculate the quantities fed during the various seasons to support the desired weight gain. A good quality starter grain specifically formulated to calves with approx. 19% protein should be introduced in small quantities already the first week of life. Palatability is important and calves tend to prefer and perform better on textured muesli type starter feed

composed of pellets and whole grain. A calf can be weaned when she is consuming approx 1 Kg grain per day. Gradual weaning over a period of 10 days has been recommended.<sup>11</sup>

Calves are mostly functioning as mono-gastric animals pre-weaning and the rumen is not fully functional prior to 6 months of age. Many times calves are fed too much hay or TMR too early in life and this is limiting the calf's growth. If the calf is fed a good quality starter grain, then no hay or very little hay is needed pre-weaning. After weaning a good quality hay should be gradually incorporated in the diet and thereafter a gradual transition onto TMR. It is important to monitor body condition and weight gain during this period to assure that the feed meets the calf's needs.

Alltech's gut health programme can assist the farmer in addressing enteric challenges and optimize growth. Mannan-oligosaccharides can support gut functioning by supporting the good commensal gut flora, increasing the mucus layer in the intestines and improve the local immune function. Meta-analysis of up to 20 studies world-wide have shown that mannan-oligosaccharide supplementation of the liquid feed to calves decrease diarrhoea, increase average daily weight gain by 65 grams per day and improves feed conversion.<sup>12;13</sup>

Metaphylactic or prophylactic inclusion antimicrobials in the feed to animals may lead to increased diarrheal disease and depressed growth rates. Furthermore individual therapeutic administration for uncomplicated diarrheal disease may lead to increased diarrheal disease days, depressed grain intake and weight gain. The dairy's medication protocols for calf health should be reviewed since the costs incurred by antibiotic treatments may even be counter-productive.<sup>14</sup>

### **Calfhood disease has long term consequences**

Poor health during early life is believed to have long-lasting effects on milk production and longevity. Numerous endemic diseases found on dairies can greatly impact productivity and health. A study of 122 dairy farms in southwest Sweden indicated that cows that had contracted mild diarrhoea during their first 3 months of life had lower milk production (344 kg less in 305 days) than those without diarrhoea.<sup>15</sup> Cryptosporidiosis is not only an enteric disease challenge in calves, as it has been shown that chronic cryptosporidiosis infection in adult cows can lead to a 3 kg reduction in daily milk production.<sup>16</sup> Bovine viral diarrhoea disease (BVDV) is another disease that impact herd productivity and a systematic review including 44 studies in 15 countries over the last 30 years indicated that direct losses up to 688 US dollars (USD) per dairy animal.<sup>17</sup> Bovine respiratory disease (BRD) is a major reason for calf mortality and has long term consequences on herd productivity. According to a Swedish study, BRD in calves under 3 months of age led to a 12% increase in calving intervals.<sup>18</sup> Others have estimated that BRD lower daily weight gain on average by 91 gr/day, and lower carcass grading.<sup>19;20</sup> A New York study indicated that heifer calves without dullness/BRD were twice as likely subsequently to calve and calved 6 months earlier compared to BRD calves.<sup>21</sup> In a herd study in Ireland, chronic calf pneumonia resulted in a 5% and 10% reduction in first and second lactation milk yield.

### **Financial impacts of getting the heifer in calf**

The rearing practices for heifers before and after breeding, as well as decisions when to breed, can have a significant impact on conception rates, productivity and longevity of the dairy cow. A model of a dairy replacement herd, showed that the average age at first calving affected the net costs of raising replacement heifers; reducing the age at first calving by 1 month lowered the cost of a replacement program of a 100 cow herd by \$1400 or 4.3%.<sup>22</sup> A UK study of the costs associated with heifer rearing estimated that each extra day in age at

first calving increased the mean cost of rearing during pregnancy by £0,33/d and an additional month would result in an additional £92.<sup>23</sup> The total cost of rearing young dairy cattle in the Netherlands was estimated as 1567€ per successfully reared heifer.<sup>24</sup> Reducing the age of first calving by one month reduced the total cost between 2,6-5,7%. The rearing costs of a heifer that experienced disease at least once were on average 95€ higher than those of healthy heifers.

## Conclusions

The evidence is clear that poor growth in young calves strongly impacts subsequent milk production. The first priority should be placed on first colostrum feed and thereafter sufficient high quality milk or milk replacer in sufficient quantities optimum growth and health and this will increase the heifer's herd life and milk production potential. Calfhood disease has long term consequences on health and productivity and therefore focus should be placed on disease prevention, as 'prevention is always better than cure'. The future performance of the herd is laid down in the young heifers; treat them well, they are the future.

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